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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

DOLAN, JENNIFER M

ART UNIT

PAPER NUMBER

2652

DATE MAILED: 08/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/801,630

Applicant(s)

LENSSEN, KARS-MICHIEL
HUBERT

Examiner

Jennifer M. Dolan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4, 6. 6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the third structure in claim 5 must be shown or the feature canceled from the claim. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 5 requires a third structure influencing at least one magnetic characteristic of the first structure. The third structure is only described in the specification in terms of function, and no written description of the structure of the third structure is provided. Thus, the third structure is not adequately described in the disclosure to convey to one skilled in the art what the third structure comprises, and to enable one skilled in the art to make and use the invention of claim 5.

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For the purposes of examination, it is assumed that the third structure is a magnetic layer positioned sufficiently close to the first structure to couple to the first structure.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 12 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 12, the phrases "such as" and "preferably", and in claim 16, the phrase "such as" render the claim indefinite because it is unclear whether the limitations following the phrases are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

7. Claims 1-4, 7, 8, 13, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No 6,175,475 to Lin et al.

Regarding claims 1, 13, and 15 Lin discloses a data storage system (column 1, lines 12 – 19) comprising a set of structures (figure 4) including: a first structure of layers (430, 420, 415, 410) including at least a first ferromagnetic layer (420) and a second ferromagnetic layer (410) with at least a separation layer of a non-magnetic material therebetween (415; figure 4), the first structure having at least a magnetoresistance effect (column 1, line 41 – column 2, line 3); a second structure (406 and 432) including at least one magnetic layer (406 and 432), the second structure influencing at least one intrinsic magnetic characteristic of the first structure (bias field/magnetic moment, column 3, lines 15 – 27); and the second structure being separated from the first structure by at least a spacer layer (408), wherein the non-magnetic material is a metal (column 5, lines 12 – 14) and the spacer layer comprises a high-resistive metallic material (column 5, lines 17 – 23). It is inherent that the spacer layer causes a mainly ferromagnetic coupling of the second structure on the first structure while not substantially influencing the magnitude of the magnetoresistance effect of the first structure, because the Ta layer separating the first and second structures is sufficiently thin (5 nm from column 5, lines 17 – 19) for ferromagnetic coupling to be the dominant coupling mechanism between the two layers, and because the Ta layer has sufficiently high resistivity to prevent the second structure from influencing the magnetoresistance of the first structure.

Regarding claim 2, Lin discloses that the second structure comprises at least one layer (432) of a magnetic material of a high coercivity.

Regarding claim 3, Lin discloses that the second structure comprises at least one layer (432) of an exchange biasing material.

Regarding claim 4, Lin discloses that the second structure comprises a layer (406, 432) that has a magnetization direction that is substantially anti-parallel with respect to the magnetization direction of the first ferromagnetic layer (column 3, lines 15 – 18).

Regarding claims 6 and 14, Lin discloses that the high-resistive metallic material is Ta (column 5, lines 17-18), which inherently induces a crystallographic characteristic on layers deposited upon it (column 4, lines 63 – 67), in this case, the second structure.

Regarding claim 7, Lin discloses that the high resistive metallic material is Ta (column 5, lines 17 – 18).

Regarding claim 8, Lin discloses that the high-resistive metallic material has a thickness of 5 nm (column 5, lines 16 – 19), which is in the range of one atomic layer up to 15 nm.

8. Claim 16 is rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No 6,127,053 to Lin et al.

Lin discloses a magnetic system such as a data storage system or a sensing system of a magnetic characteristic (column 1, lines 8 – 11), the system comprising a set of structures (figure 8) including: a first structure of layers including at least a first ferromagnetic layer structure (420) and a second ferromagnetic layer (410) with at least a separation layer of a non-magnetic material therebetween (415), the first structure having at least a magnetoresistance effect (column 1, line 53 – column 2, line 13); a second structure including at least one magnetic layer (406), the second structure influencing at least one intrinsic magnetic characteristic of the first structure (column 2, lines 19 – 29); the second structure being separated from the first structure by at least a spacer layer (408) of a high-resistivity metallic material (column 7, lines 26 – 27)

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furthermore influencing the coupling of the second structure on the first structure while not substantially influencing the magnitude of the magnetoresistance effect of the first structure (column 6, lines 39 – 50; column 2, lines 19-29; also, it is inherently the case that the second structure will not substantially influence the MR effect of the first structure, since the Ta spacer only allows the second structure to weakly couple to the first structure). Lin further discloses that the first ferromagnetic layer structure can comprise 2 nonabutting ferromagnetic layers (column 11, lines 60 – 61 and figure 7b and 8), while the second structure comprises 1 ferromagnetic layer (406). Thus, Lin discloses that the first ferromagnetic layer structure and second structure respectively comprise an even number of non-abutting ferromagnetic layers and an odd number of non-abutting ferromagnetic layers.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '475 in view of U.S. Patent No. 5,742,162 to Nepela et al.

Lin fails to disclose a system further comprising a third structure.

Nepela discloses a system comprising a third structure (bottom instance of 23 and 22 in figure 3) including at least one magnetic layer (22), the third structure influencing at least one magnetic characteristic of the first structure (12-16; column 3, lines 11 – 27). It is implicit that the second structure (top instance of 23 and 22 in figure 3) at least partly compensates for the influencing of the third structure on the first structure, because both the second and third structure are necessary for generating zero magnetostatic force on the free layer (column 3, lines 11 – 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the structure of Lin to include the third structure of Nepela. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide a third structure, because it allows the net magnetostatic field upon the free layer to be set to zero, and allows the use of contiguous junction biasing, which decreases Barkhausen noise in the system (column 2, lines 15 – 42).

11. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '475 in view of U.S. Patent No. 6,166,539 to Dahlberg et al.

Lin discloses that the layer of high-resistive material is made of Ta, Al_2O_3 or SiO_2 (column 5, lines 17 – 18 and column 6, lines 26 – 28).

Lin fails to disclose a metallic polymer with a conductivity in the range of the conductivities of the group of Ti, Zr, Hf, etc.

Dahlberg discloses that polyimide can be used in place of Al_2O_3 or SiO_2 in a magnetic head (column 16, lines 42 – 43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the layer of high-resistive material of Lin with a polymer, as taught by Dahlberg. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to substitute the polymer for the high-resistive material, because Dahlberg shows that they can be used interchangeably.

12. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '475 in view of U.S. Patent No. 6,178,072 to Gill.

Lin discloses that the second structure is separated from the first structure by a layer selected from a group including high-resistive metallic materials (Ta) and insulating layers (Al_2O_3 , SiO_2).

Lin fails to disclose that the spacer comprises a layer of a high-resistive metallic material and an insulating layer abutting the high-resistive layer.

Gill discloses a spacer comprising a layer of high-resistive metallic material (308) and an insulating layer (306) abutting the layer of high-resistive metallic material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the magnetoresistive structure of Lin, so that the spacer includes the high-resistivity material abutting an insulating layer, as taught by Gill. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide an insulating layer abutting a high-resistivity layer, in order to prevent shunting of the magnetoresistive sense current of the first structure through the second structure. This allows the

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second structure to be designed in such a way that read signal symmetry and greater thermal stability are achieved (Gill, column 3, lines 15 – 24).

13. Claims 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '475 in view of U.S. Patent No. 6,114,719 to Dill et al.

Regarding claim 9, Lin discloses a spacer layer made of a Ta, which is a high-resistive metallic material (column 5, lines 17 – 18).

Lin fails to disclose that the high-resistive metallic material is made of Cr, Mo, or W.

Dill discloses a nonmagnetic spacer layer made of Cr (column 7, lines 4-8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the spacer layer of Lin so that it is made of Cr, as taught by Dill. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to use Cr for the spacer layer, since it is a recognized art equivalent to Ta as a nonmagnetic high-resistivity spacer material (Dill, column 7, lines 5-7), and thus Cr and Ta can be used interchangeably in this capacity.

Regarding claim 12, Lin teaches a magnetoresistive read sensor, but fails to disclose a magnetic memory structure.

Dill discloses a magnetic memory structure (column 1, lines 45 – 50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the magnetoresistive structure of Lin so that it can be used in memory structures, as taught by Dill. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to use the magnetoresistive structure in

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a memory structure, because equivalent structures can be used for both solid state memory and external magnetic field read sensors (Dill, column 1, lines 45 – 50). Thus, it is well within the purview of a person having ordinary skill in the art to use a magnetoresistive sensing structure in either a memory structure or a magnetoresistive read head.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (703) 305-3233. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and same for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Jennifer M. Dolan
Examiner
Art Unit 2652

jmd
August 1, 2002

HOA T. NGUYEN
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8/9/02